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CERTIFICATION OF FACSIMILE TRANSMISSION

I hereby certify that these papers, consisting of 15 pages total, are being facsimile transmitted to the Patent and Trademark Office 703-872-9306 on the date shown below.

DATE: December 17, 2004

L. Anne Kinsman
Registration No.: 45,291

TO THE ATTENTION OF:	
MAIL STOP:	MAIL STOP PETITION
COMPANY:	United States Patent and Trademark Office
CITY:	Arlington, Virginia, U.S.A.
FAX NUMBER:	703-872-9306
DATE / TIME:	December 17, 2004
FROM:	L. Anne Kinsman
DIRECT DIAL:	(613) 237-5160
OUR FAX NUMBER:	(613) 787-3558

RE: United States Patent Appln No. 09/503,834
Title: NOISE FLOOR LEVEL ESTIMATION
Inventor(s): PATENAUDE, Francois; DUFOUR, Martial
Our File: PAT 1952B-2 US

NUMBER OF PAGES, INCLUDING THIS PAGE: 15
CONFIRMATION TO FOLLOW: NONE

FAX/TELEC

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	PATENAUDE, Francois; DUFOUR, Martial
Serial No.:	09/503,834
Filed:	February 15, 2000
Title:	NOISE FLOOR LEVEL ESTIMATION
Group:	2863
Examiner:	PRETLOW, Demetrius R.
Attorney Ref.:	PAT 1952B-2 US
Customer No.:	23051

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December 17, 2004

Commissioner for Patents
P.O. Box 1450
Alexandria VA 22313-1450
U.S.A.

Attention: Mail Stop Petition

PETITION FOR REVIVAL OF AN APPLICATION FOR PATENT ABANDONED UNINTENTIONALLY UNDER 37 CFR 1.137(b)

This is in response to the Notice of Abandonment dated **September 17, 2004**, a partial copy of which was received in our offices on December 16, 2004.

Applicant respectfully submits herewith a true copy of our Amendment, dated May 24, 2004, together with our facsimile transmission page which indicates that the documents were successfully transmitted to the United States Patent and Trademark Office on May 24, 2004. Applicant respectfully requests that the application be revived without any additional fees.

Please acknowledge receipt of this submission.

No fees are believed due. **However, the Commissioner is hereby authorized to charge to Deposit Account Number 501593 any required fees for processing this request.**

Respectfully submitted,

By: ______________________
L. Anne Kinsman
Reg No. 45,291

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ALK/
Encls.
1. Facsimile Transmission Report
2. Facsimile Cover Page (which includes Certificate of Facsimile Transmission)
3. Amendment dated May 24, 2004

MEMORY TRANSMISSION REPORT

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I hereby certify that these papers, consisting of 12 pages total, are being facsimile transmitted to the U.S. Patent and Trademark Office at 703-872-9306 on the date shown below.

DATE: May 24, 2004

L. Anne Kinsman
Reg. No. 45,291

FAX/TELEC

TO THE ATTENTION OF:	**PRETLOW, Demetrius R.**
MAIL STOP:	**MAIL STOP Amendment**
COMPANY:	**U.S. Patent and Trademark Office**
CITY:	**Arlington VA**
FAX NUMBER:	**1-703-872-9306**
DATE / TIME:	**May 24, 2004**
FROM:	**Anne Kinsman**
DIRECT DIAL:	**(613) 787-3519**
OUR FAX NUMBER:	**(613) 787-3558**

RE: United States Patent Appln No. 09/503,834	
Title:	**NOISE FLOOR LEVEL ESTIMATION**
Inventor(s):	**PATENAUDE, Francois; DUFOUR, Martial**
Our File:	**PAT 1952B-2 US**

NUMBER OF PAGES, INCLUDING THIS PAGE: 12
CONFIRMATION TO FOLLOW: None

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	PATENAUDE, Francois; DUFOUR, Martial
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Title:	NOISE FLOOR LEVEL ESTIMATION
Group:	2863
Examiner:	PRETLOW, Demetrius R.
Attorney Ref.:	PAT 1952B-2 US
Customer No.:	23051

May 24, 2004

Mail Stop Amendment
Commissioner for Patents
2011 South Park Place
Crystal Plaza Two
Lobby Room 1B03
Arlington, Virginia
22202
U.S.A.

AMENDMENT

Dear Sirs:

In response to the Office Action dated February 24, 2004 please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of the claims which begins on page 2 of this paper

Remarks/Arguments begin on page 11 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior version, and listings, of the claims in the application:

Listing of Claims:

1. (currently amended) A method of estimating the noise floor of a continuous wideband analogue signal comprising the steps:

a. representing the continuous wideband analogue signal as a series of discrete frequency and amplitude values;

b. creating a histogram based on the discrete frequency and amplitude values by:
establishing a lowest bin representing the lowest integer value of the discrete series representing the wideband signal,
establishing a highest bin representing the highest integer value of the discrete series representing the wideband signal,
establishing bins for each integer value between the lowest and highest bins, and
incrementing the value of at least one bin when there is an upward or downward crossing of the bin by at least one segment of the series representing the wideband signal; and

c. deriving a noise floor estimate from characteristics of the histogram.

2. (currently amended) The noise floor estimation method of claim 1 wherein the ~~method of obtaining the series of discrete frequency and amplitude values~~ step of representing the continuous signal includes the steps of:

a. sampling ~~a~~ the received wideband signal ~~by~~ using a plurality of analogue-to-digital converters to generate a series of output signals;

b. windowing the output signals of the analogue-to-digital converters;

c. applying a mathematical transform to the results of the windowing to obtain a series of discrete frequency values,

d. converting ~~an~~ the amplitude of each discrete frequency value to log-domain representation, and

e. rounding the log-domain representation of the amplitude for each discrete frequency value to the nearest integer value to generate a discrete amplitude value.

3. (currently amended) The noise floor estimation method of claim 2 wherein the <u>step of</u> windowing ~~process~~ includes the steps of:

a. selecting a discrete valued weighting function;

b. multiplying the value of each output signal of the series by a corresponding element of the discrete weighting function.

4. (currently amended) The noise floor estimation method of claim 2 wherein the mathematical transform ~~used~~ is a ~~Fast~~ <u>discrete</u> Fourier Transform.

5. (currently amended) The noise floor estimation method of claim 2 wherein the <u>step of converting the</u> amplitude ~~of each value of the discrete frequency series is converted~~ to log domain representation ~~by~~ <u>includes</u> multiplying 20 by the base 10 logarithm of the magnitude of the ~~element~~ <u>amplitude</u>.

6. (original) The noise floor estimation method of claim 2 wherein the log domain representation of the amplitudes results in the amplitudes being expressed as decibel (dB) values.

7 (original) The noise floor estimation method of claim 2 wherein the log domain representation of the amplitudes results in the amplitudes being expressed as decibel milliwatt (dBm) values.

8. (cancelled)

9. (currently amended) The noise floor estimation method of claim ~~8~~<u>1</u> wherein the step of deriving the noise floor estimate from the characteristics of the histogram includes the steps of:

a. defining the lowest dB bin as a starting point

b. determining the next lowest valued local maximum on the histogram;

c. performing a Y test <u>on the determined maximum</u>;

d. repeating steps b and c until the Y test fails;

e. setting the noise floor by adding an offset to the dB value of the maximum of the histogram that caused the Y test failure.

10. (currently amended) The noise floor estimation method of claim 9 wherein performing the Y test includes the steps of:

a. examining all points in the next Y dB;

b. considering the test a pass when a point exists in the next Y dB which has a higher value than the starting point;

c. considering the test a fail when no point exists in the next Y dB which has a higher value than the starting point.

11. (original) The noise floor estimation method of claim 10, wherein Y is 3 dB.

12. (original) The noise floor estimation method of claim 9, wherein the offset is determined based on observed characteristics of the signal and the windowing process' discrete weighting function.

13. (original) The noise floor estimation method of claim 12, wherein the offset is selected from the group of 2 dB for a rectangular window, 2.75 dB for a Hanning window, 3 dB for a Blackman window, and 3.2 dB for a flat top window.

14. (currently amended) A method of estimating the noise floor of a continuous wideband analogue signal comprising ~~The noise floor estimation method of claim 1, wherein the step of creating the histogram includes the~~ steps of:

a. representing the continuous wideband analogue signal as a series of discrete frequency and amplitude values;

b. creating a histogram based on the discrete frequency and amplitude values by:

~~a.~~ establishing a lowest bin representing the lowest integer dB value of the discrete series representing the wideband signal;

~~b.~~ establishing a highest bin representing the highest integer dB value of the discrete series representing the wideband signal;

~~c.~~ establishing bins for each integer dB value between the lowest and highest bins so that there are a total of MK bins;

~~d.~~ c. incrementing the bins for each time an element in the discrete series falls into the bin; and

c. deriving a noise floor estimate from characteristics of the histogram.

15. (currently amended) The noise floor estimation method of claim 14, wherein the step of deriving the noise floor estimate from the characteristics of the histogram includes the steps of:

a. sorting the elements of the histogram in decreasing order of amplitude to create a sorted vector;

b. reducing the size of the sorted linear vector from MK to M by summing groups of K consecutive elements of the sorted linear vector for achieving a more discretised amplitude representation;

c. applying one of a log-likelihood function, and a quasi log-likelihood function, to the M elements of the sorted linear vector to achieve a discrete function L(k);

d. subtracting L(k) from a multiple (C) of a discrete penalty function p(k) to obtain the function $-L(k)+C\,p(k)$;

e. identifying the index, denoted by q_{NF}, at which the minimum of the $-L(k)+C\,p(k)$ equation is achieved; and

f. computing the noise floor level estimate per ~~FFT~~ bin by dividing the mean of the $M-q_{NF}-1$ smallest values of the M sorted vector by K.

16. (original) The noise floor estimation method of claim 15, wherein M is considerably larger than K.

17. (original) The noise floor estimation method of claim 16, wherein M = 64.

18. (original) The noise floor estimation method of claim 16, wherein K=8.

19. (original) The noise floor estimation method of claim 15 wherein

$$L(k) = K\ln\left[\frac{\prod_{i=k+1}^{M} l_i}{\left(\frac{1}{M-k}\sum_{i=k+1}^{M} l_i\right)^{M-k}}\right]$$, where

L(k) is represented by the quasi-log-likelihood function

k is the index of the function.

20. (original) The noise floor estimation method of claim 15, wherein the penalty function is a polynomial

21. (original) The noise floor estimation method of claim 15, wherein the penalty function is represented by the second order polynomial function

$$\rho(k) = \left[3.76\left(\frac{M-1-k}{M-1}\right)^2 + 1.43\left(\frac{M-1-k}{M-1}\right)\right]MK$$

22. (original) The noise floor estimation method of claim 15, wherein the constant C is -2.6.

23. (currently amended) A wideband analogue signal noise floor estimation apparatus comprising:

a. a digitizer module for creating a discrete series representation of ~~the~~ a continuous wide band analogue signal, the representation comprised of discrete frequency and amplitude values;

b. a histogram module for generating a histogram based on the discrete frequency and amplitude values~~,~~, the histogram module including

a low bin establishing element for creating a low valued bin to represent the integer value of lowest valued element in the discrete series representing the wideband signal,

a high bin establishing element for creating a high valued bin to represent the integer value of the highest valued element in the discrete series representing the wideband signal,

a tertiary bin creation element for creating bins for each integer value between the lowest and highest bins, and

a bin count incrementing element for incrementing a value of a bin when there is an upward or downward crossing of the bin by at least a segment of the discrete series; and

c. an estimation module for deriving an estimate of the noise floor of the wideband signal based on the characteristics of the histogram

24. (original) The noise floor estimation apparatus of claim 23, wherein the digitizer module further comprises.

a. a sampling module including a plurality of analogue-to-digital converters for generating a series of output signals;

b. a windowing module for weighing the output signals of the sampling element to generate weighed output signals;

c. a transforming module for applying a mathematical transform to the weighed output signals to create a signal comprised of discrete frequency values that represent the original signal;

d. an amplitude domain converter for converting the linear amplitude values to log-domain representation; and

e. an amplitude discretizing module for representing the output of the amplitude domain conversion element as a sequence of integer valued amplitude levels.

25. (original) The noise floor estimation apparatus of claim 24, wherein the windowing module further includes a weighting element for multiplying each value of the output series by a corresponding element of a preselected discrete valued weighting function.

26. (original) The noise floor estimation apparatus of claim 24, wherein the transforming module applies a Fast Fourier Transform.

27. (original) The noise floor estimation apparatus of claim 24, wherein the amplitude discretizing module is constructed to convert each amplitude value of the discrete frequency series to 20 times base 10 logarithm of the magnitude of the value.

28. (original) The noise floor estimation apparatus of claim 24, wherein the amplitude domain converter outputs amplitude values as decibel (dB) values.

29. (original) The noise floor estimation apparatus of claim 24, wherein the amplitude domain converter outputs amplitude values as decibel milliwatt (dBm) values.

30. (cancelled)

31. (original) The noise floor estimation apparatus of claim 23, wherein the estimation module further includes:

a. a maxima finding element for finding the next left most maximum from a given starting point, that in the absence of previous data takes the lowest dB bin as a starting point;

b. a Y test element for performing a Y test;

c. a decision element for calling upon the maxima finding element until the Y test element reports a fail; and

d. a noise floor setting element for providing a noise floor estimate by adding an offset to the dB value reported by the maxima finding element that caused the Y test element to report a fail.

32. (original) The noise floor estimation apparatus of claim 31, wherein the Y test element further includes:

a. an examination element for searching the Y dB to the right of the given starting point for a value higher than the starting point; and

b. a reporting element for reporting a fail when no point exists in the next Y dB that has a higher value than the starting point and reports a pass if there is a value in the next Y dB that is greater in value than the starting point.

33. (original) The noise floor estimation apparatus of claim 32, wherein Y is set at 3 dB.

34. (original) The noise floor estimation apparatus of claim 31, wherein the offset used by the noise floor setting element is based on observed characteristics of the signal and the windowing process' discrete weighting function.

35. (original) The noise floor estimation apparatus of claim 34, wherein the offset is selected from the group of 2 dB for a rectangular window, 2.75 dB for a Hanning window, 3 dB for a Blackman window, and 3.2 dB for a flat top window.

36. (currently amended) A wideband analogue signal noise floor estimation apparatus comprising: ~~The noise floor estimation apparatus of claim 23, wherein the histogram module further includes:~~

a. a digitizer module for creating a discrete series representation of a continuous wide band analogue signal, the representation comprised of discrete frequency and amplitude values;

b. a histogram module for generating a histogram based on the discrete frequency and amplitude values, the histogram module including

~~a.~~ a low bin establishing element for creating a low valued bin to represent the lowest integer dB values of the discrete series representing the wideband signal;

~~b.~~ a high bin establishing element for creating a high valued bin to represent the highest integer dB value of the discrete series representing the wideband signal;

~~c.~~ a tertiary bin creation element for creating bins for each integer dB value between the lowest and highest bins; and

~~d.~~ a bin count incrementing element for incrementing the value of a bin for each time an element in the discrete series falls into the bin.

37. (original) The noise floor estimation apparatus of claim 23, wherein the estimation module further includes:

a. a sorting element for creating a vector containing the discrete amplitudes of the input signal in decreasing order;

b. a vector size reducing element for reducing the size of the sorted linear vector from MK elements to M elements by summing groups of K consecutive elements of the sorted linear vector to achieve a more discretised amplitude representation;

c. a log-likelihood element for applying a log-likelihood, or a quasi log-likelihood function, to the M elements of the sorted linear vector output from the vector reducing element to achieve a discrete function L(k);

d. a penalty function element for subtracting the discrete function L(k) from a multiple (C) of a discrete penalty function p(k) to obtain the function $-L(k)+C\,p(k)$ (PLLM function);

e. an index identification element for identifying the index at which the minimum of the PLLM function, $-L(k)+C\,p(k)$, is achieved and identifying the index, denoted by q_{NF}, at which the minimum of the $-L(k)+C\,p(k)$ equation is achieved; and

f. a noise floor setting element for providing a noise floor estimate by dividing the mean of the $M-q_{NF}-1$ smallest values of the M sorted vector by K.

38. (original) The noise floor estimation apparatus of claim 37, wherein the penalty function element is constructed to apply a polynomial as the penalty function.

39. (original) The noise floor estimation apparatus of claim 37, wherein the penalty function element is constructed to apply the second order polynomial function $p(k)=\left[3.76\left(\frac{M-1-k}{M-1}\right)^2+1.43\left(\frac{M-1-k}{M-1}\right)\right]MK$ as the penalty function.

Remarks/Arguments

Applicant requests that the application be amended as above described. Claims 1-5, 9, 10, 14, 15, 23 and 36 have been amended. Claims 8 and 30 have been cancelled. Claims 1-7, 9-29 and 31-39 are currently pending in the application. No new claims have been added.

In the Office Action dated February 24, 2004, the Examiner rejected claims 1 and 23 under 35 U.S.C. 102(a) as being anticipated by U.S. Patent No. 6,240,282 to Kleider et al. The Applicant thanks the Examiner for finding claims 2-22 and 24-39 allowable if rewritten in independent form to include all the limitations of the base claim and any intervening claims. Accordingly, claim 1 has been amended to include the subject matter recited in cancelled claim 8; claim 14 has been rewritten independent form; claim 23 has been amended to include the subject matter of cancelled claim 30; and claim 36 has been rewritten in independent form. No new matter has been added, though Applicant has recited an "upward and downward crossing", as opposed to a "positive slope", as supported at p. 10, line 28 of the application as filed. Applicant submits that nothing in Kleider et al. teaches or suggests incrementing a bin value in response to an upward or downward crossing, or falling into, the bin of a series segment. Therefore, Applicant submits that amended claims 1, 14, 23 and 36 are clearly distinguished from Kleider et al., and withdrawal of the Examiner's rejection under 35 U.S.C. 102(a) is respectfully requested

Claims 2 - 5, 9, 10 and 15 have been amended to accord with the changes to claims 1 and 14, and to provide proper antecedent basis for all elements.

Therefore, Applicant submits that the application is now in condition for allowance, and favourable action to that end is respectfully requested.

Respectfully submitted,
PATENAUDE, Francois, et al.

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